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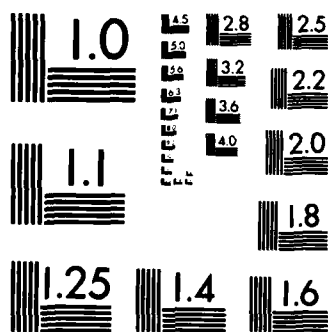
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TECHNICAL REPORT P-85/04, SUPPLEMENT 1
July 1986

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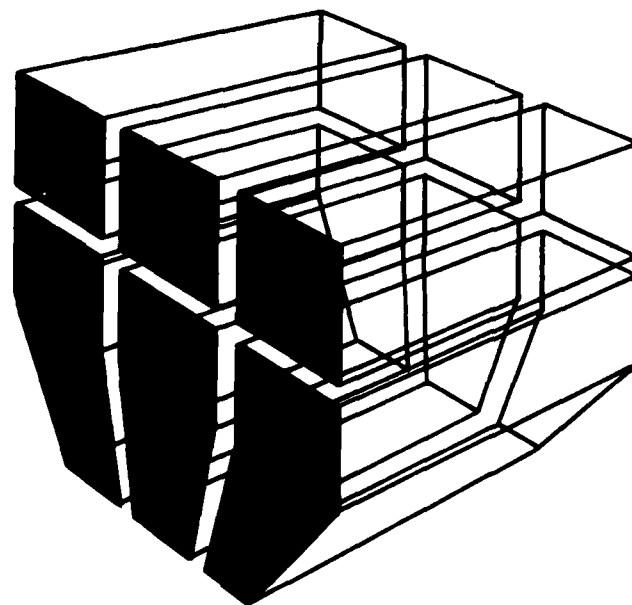
Supplement to USA-CERL Technical Report P-85/04:

Guide for Quality Assurance Inspection of Commerical Activities Contracts for Real Property Maintenance Activities

by
John H. Williamson
Timothy D. Holcomb

The information in this report supplements U.S. Army Construction Engineering Research Laboratory (USA-CERL) Technical Report P-85/04, *Guide for Quality Assurance Inspection of Commerical Activities Contracts for Real Property Maintenance Activities*. Additional guidance is provided on how to do Quality Assurance (QA) surveillance of work performed by contractors on government property. Emphasis is placed on inspecting a small percentage (about 10 percent) of the total work performed. The sampling method used varies with the type of work being evaluated and the contractor's performance.

Inspection guidance is presented for addition to the "Utilities Operation and Maintenance" chapter of P-85/04. Information is provided for three additional task units, including gas distribution, electric distribution, and heating, ventilating, and air-conditioning systems. Guidance is presented for inspecting individual jobs within that task unit. The guidance includes performance indicators, quality assurance evaluation methods, detailed procedures, and example worksheets and checklists.



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The information in this report supplements U. S. Army Construction Engineering Research Laboratory Technical Report P-85/04, Guide for Quality Assurance Inspection of Commercial Activities Contracts for Real Property Maintenance Activities. Use this report as follows:

Replace page iii of the original report with the new page iii provided here.

Replace Table of Contents of the original report with the new copy provided here.

Insert the new Sections 3-3, 3-4, 3-5, and 3-6 and their cover sheets after Section 3-2 (Sewage Services) in the original report.

Insert the blank copies of worksheets and checklists provided for the new sections at the end of Appendix B of the original report.

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FOREWORD

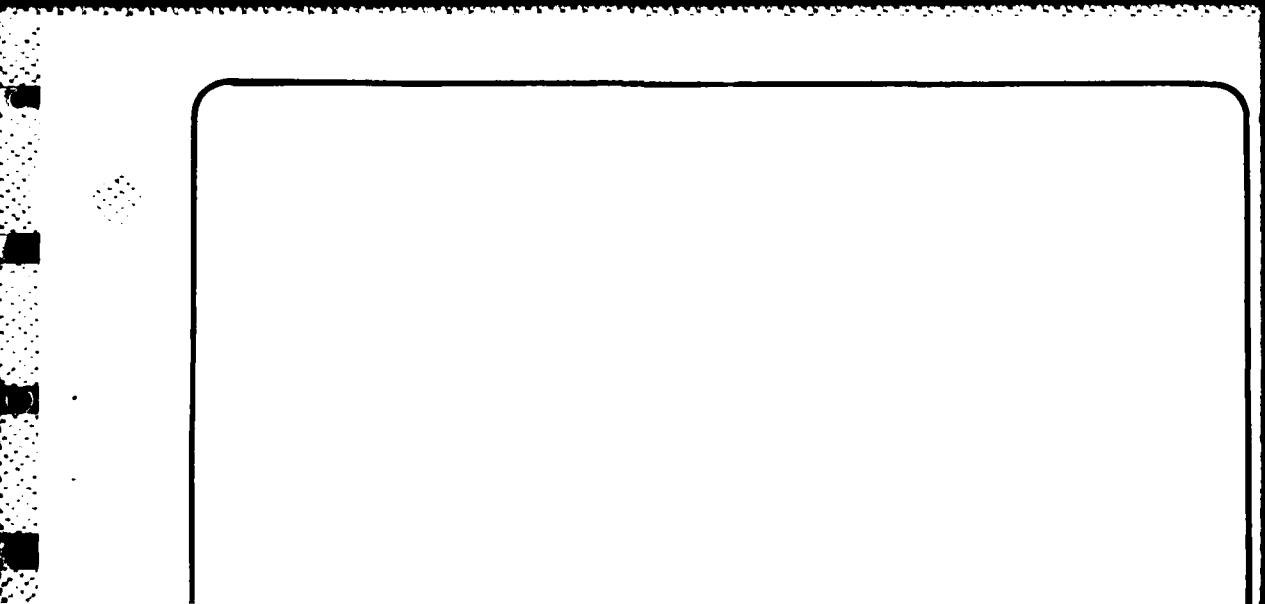
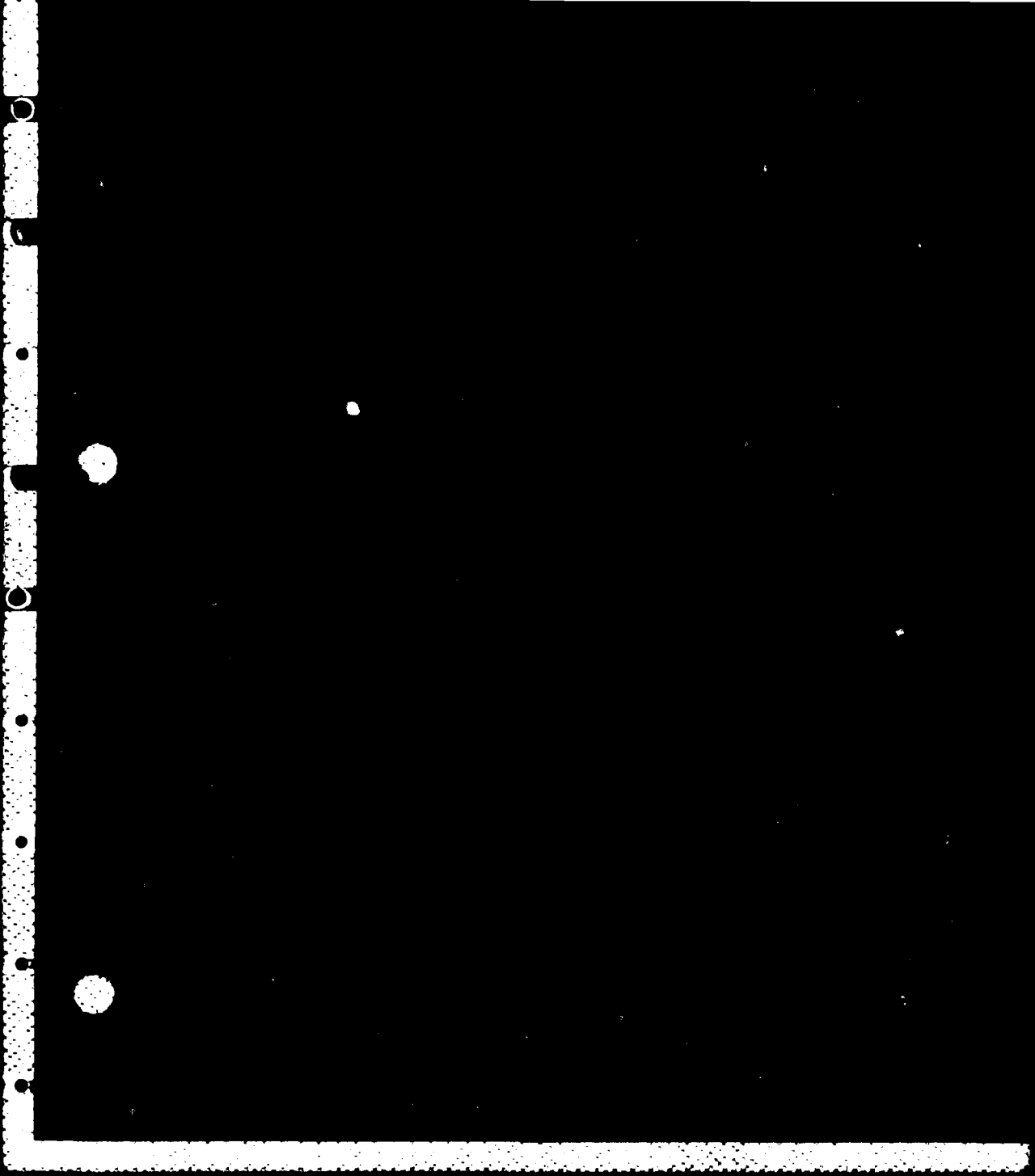
This research was conducted for the Office of the Assistant Chief of Engineers (OACE) by the Facility Systems (FS) Division, U.S. Army Construction Engineering Research Laboratory (USA-CERL). The work was performed under Project 4A162731A141, "Military Facilities Engineering Technology"; Technical Area C, "Operations and Maintenance"; Work Unit 051, "QA on Commercial Activities Contracts." Mr. George Cromwell, DAEN-ZCF-M, was the OACE Technical Monitor.

The USA-CERL Principal Investigator was Mr. John Williamson. Mr. E. A. Lotz is Chief of USA-CERL-FS.

COL Paul J. Theuer is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

LIST OF ACRONYMS

AQL: acceptable quality level
 COR: Contracting Officer's Representative
 GFE: government-furnished equipment
 IJO: individual job order
 KO: Contracting Officer
 O&M: operations and maintenance
 PM: preventive maintenance
 PMI: preventive maintenance inspection
 QA: quality assurance
 QAE: Quality Assurance Evaluator
 QC: quality control
 SO: service order



GAS DISTRIBUTION

A. REPORTS

B. OPERATIONS ACTIVITIES

C. MAINTENANCE

This section provides information needed to inspect O&M of the components of a complete gas distribution system.

Evaluation of the contractor's performance in providing these services should be scheduled by (1) determining when the contractor intends to complete his/her documentation of the previous month's O&M activities and (2) when regulatory agency reports will be received. The QA evaluation should be scheduled within 3 days of report receipt. Proper coordination will allow the QAE to inspect all gas distribution system services at one time. Recommended methods and detailed procedures for the evaluations are described separately in the following sections.

A. REPORTS

The contractor must submit required annual reports to the U.S. Department of Transportation and, if required, to appropriate state regulatory agencies. Copies of all reports must be submitted to the COR.

B. OPERATIONS ACTIVITIES

1. Documentation. The contractor's documentation for operating the gas distribution system should include the following as a minimum: an emergency plan, to be updated annually, that reflects system changes; an outline of procedures for responding to system failures; and documentation of the measurement of system use and odorization content.

2. Performance. Besides evaluating the contractor's documentation, the QAE should verify the actual performance of the following activities by on-site inspection: leakage surveys, valve maintenance, relief device testing, regulator station inspection, odorization content measurement, repairs, and system use measurement.

PERFORMANCE INDICATORS

1. The required reports must be complete and submitted to the appropriate regulatory agencies on time; copies must be submitted to the COR.
2. The contractor's documentation for operation of the gas distribution system must be submitted to the COR on time and must be complete.
3. The QAE should observe the contractor measuring the odorization content of the gas.
4. If required by the contract, the contractor must collect, record, and submit monthly readings for all gas customers. The QAE inspection should verify meter readings submitted by the contractor.

Evaluation of the contractor's performance in providing all of the above services should be scheduled by determining when the contractor intends to complete documentation of the previous month's O&M activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation should be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. Recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Gas Distribution Operations)
2. QA Checklist (Gas Distribution Operations)

The sample forms provided in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicators 1 and 2 should be evaluated on a monthly basis by 100 percent inspection. Performance indicator 3 should be evaluated by determining when the contractor has scheduled the activity and randomly selecting times to observe the activities.

Initially, performance indicator 4 should be evaluated using systematic random sampling. Using the contractor's report of meters read and the systematic random sampling procedures outlined in Chapter 2 (normal surveillance, 10 percent AQL), the QAE should select the meter readings to be verified. Results should be documented using the Gas Distribution Operation Checklist, and deficiencies should be noted.

If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the meter readings supplemented by validating customer complaints.

DETAILED PROCEDURES

Using the Gas Distribution Operation Checklist and following the procedures on the Gas Distribution Operation Worksheet, schedule an evaluation by the QAE of the contractor's documentation or field-inspect the selected work items. The following tasks should be done:

1. Verify that the reports required by the U.S. Department of Transportation and state regulatory agencies have been submitted on time and are acceptable to the reviewing agency. To be considered satisfactory, the contractor must furnish evidence of satisfactory compliance for this performance indicator.
2. Review the contractor's operation checklist. All of the listed items must have been dated and initialed by the person who performed the work. As a minimum, the documentation must include reports on odorization content measurements and usage measurement.
3. Accompany the contractor's representative twice during the contract period and observe measurement of the odorization content of the gas. The contractor is responsible only for checking the content and reporting the results to the COR and the gas supplier. The gas supplier is responsible for corrective action.
4. Use the listing of metered gas users and the systematic random sampling procedures outlined in Chapter 2 (normal surveillance and 10 percent AQL) to select the gas meters for reading verification. The QAE should collect the meter readings from the selected locations and compare them with those furnished by the contractor. The readings should agree, with allowance for usage between the two readings.

Unusually high usages should have been identified and confirmed by the contractor as having reasonable cause or as indicating a possible leak. Unjustifiably high customer or master meter readings must have been satisfactorily explained and the condition resolved.

EXAMPLE QA WORKSHEET

GAS DISTRIBUTION

QUALITY ASSURANCE WORKSHEET (GAS DISTRIBUTION OPERATIONS)

CONTRACT REQUIREMENT: Operate the gas distribution system.

PERFORMANCE INDICATORS: Use QA Checklist (Gas Distribution) to record performance.

1. The required reports have been submitted to the appropriate regulatory agencies.
2. The contractor's approved documentation for O&M of the gas distribution system show when the listed tasks were performed and are initiated by the operator.
3. The QAE has observed measurement of the odorization content of the gas.
4. If required by the contract, the contractor has collected, recorded, and submitted monthly readings for all gas customers. The QAE random inspection verifies the meter readings submitted by the contractor.

QUALITY ASSURANCE EVALUATION METHODS:

Performance indicators 1 and 2 for this task unit should be evaluated monthly, using 100 percent inspection of the contractor's documentation of performance.

Performance indicator 3 should be evaluated by a planned sampling of the contractor's measurement of the odorization content of the gas. The QAE should obtain the schedule for these tests and randomly select several opportunities to observe throughout the contract period.

Initially, performance indicator 4 should be evaluated using systematic random sampling. Using the population size 1273, and referring to Table A1 of Appendix A gives 21 number of samples and 4 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 60.

If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the meter readings, supplemented by validated customer complaints.

GAS DISTRIBUTION

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QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION OPERATIONS)

REQUIREMENT: The required reports have been submitted and accepted.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

REQUIREMENT: Documentation of operation activities is complete.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

REQUIREMENT: Gas odorization content has been measured.

(CIRCLE ONE) ☐ S ☐ U ☒ N
QAE REMARKS:

no tests scheduled

REQUIREMENT: Meter readings agree with those sampled.

(CIRCLE ONE) ☒ S ☐ U ☐ N (See attached checklist.)
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

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QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION OPERATION)

Verification of Gas Meter Readings

Location/Building	Reported Date	Reported Reading	Verified Date	Verified Reading
471	3/18/85	4251	3/24/85	4293
1101	3/18/85	10036	3/24/85	10047

Shukla
Quality Assurance Evaluator
Date 3/21/85

C. MAINTENANCE

DOCUMENTATION

The contractor's documentation for maintenance of gas distribution systems should include, as a minimum: the annual schedule for leakage surveys; a map showing areas surveyed for leaks and the methods used; documentation of annual maintenance of key distribution valves, testing of relief devices, and inspection and maintenance of regulator stations; and repairs.

The contractor's activities for gas distribution system maintenance should include a preventive maintenance inspection, preventive maintenance, and repairs.

PERFORMANCE INDICATORS

1. The contractor's documentation for gas distribution system maintenance must be submitted on time and must be complete.
2. The contractor's PMI reports for gas distribution systems must be submitted on time, and QAE inspection of the documentation should not show deficiencies or discrepancies.
3. Random leakage checks made by the QAE must verify the contractor's reports.
4. Random observations of the annual inspection and maintenance of key valves, relief devices, and regulator stations should show the contractor to be regularly and systematically adhering to a plan that includes all equipment.
5. The contractor's preventive maintenance (PM) must be performed and his/her PM report complete.

6. The contracted Service Order (SO) and Individual Job Order (IJO) work must be done in a timely, effective, and workmanlike manner. Repairs should restore service to affected areas within a reasonable time and should be done in accordance with Army Technical Manual 5-654, Maintenance and Operation of Gas Systems. The overall quality and appearance of the repair, including materials, should be comparable to the facility's original construction quality and appearance. The QAE inspection results of the facilities sampled for the contractor's report of work completed must not show any deficiencies.

Evaluation of the contractor's performance in providing all of the above services should be scheduled by determining when the contractor intends to perform maintenance activities and then conducting the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Gas Distribution Maintenance)
2. QA Checklist (Gas Distribution Maintenance)

The sample forms provided in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicator 1 should be evaluated using the 100 percent inspection method to check the completeness of the contractor's reports. (If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's reports.)

Performance indicator 2 should be evaluated using the 100 percent inspection method to check the completeness of the contractor's PMI report. Unscheduled field inspection should be used to check areas of poor past performance and areas specified by the Contracting Officer (KO) or his/her representative. Such action should be coordinated with the KO or his/her representative. If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PMI report.

Performance indicators 3 & 4 should be evaluated using a systematic random sampling method to inspect for leaks and the exercising of valves.

Performance indicator 5 should be evaluated using the 100 percent inspection method to check the completeness of the contractor's PM report and QC checklist. Also, an unscheduled field inspection should be used to check areas of poor past performance and areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PM report and QC checklist.

Performance indicator 6 should be evaluated using a systematic random sampling procedure to inspect SOs and the 100 percent inspection method to check IJOs.

GENERAL PROCEDURES

1. Performance Indicator 1. Each month, inspect all of the contractor's documentation within 3 days of scheduled completion. Document the results on the Gas Distribution Maintenance Checklist, and compare them to previously acceptable data to detect discrepancies.

2. Performance Indicator 2. Using the contractor's PMI report and the 100 percent inspection procedures outlined in Chapter 2, check to see that all facilities scheduled for a PMI have been recorded as such on the contractor's PMI report. Document the results on the Gas Distribution Maintenance Checklist, and compare them to the contractor's PMI report to detect discrepancies.

To perform unscheduled inspections, use the contractor's PMI records to determine the facilities to be sampled, including all areas specified by the KO or his/her representative. Schedule the inspection so that the QAE may accompany the contractor during the inspection. The QAE should use the Army Technical Manual 5-654 and DOT's Guidance Manual for Operators of Small Gas Systems to inspect the distribution system. Document the results of the inspection on the Gas Distribution Maintenance Checklist, and compare the results to the contractor's PMI report to detect discrepancies. If discrepancies are found, the contractor should include those repair items noted by the QAE on the contractor's PMI report.

3. Performance Indicator 3. Evaluate the contractor's disposition of customer complaints of suspected gas leaks; verify that the complaints have been satisfied by repair, or determine that the complaint was invalid. The QAE should independently conduct a random inspection of highly critical areas within the gas distribution system and, using a sniffer-type gas detector, verify that no gas leaks are present. Areas such as schools, hospitals, and other areas where significant life/safety hazards from gas leaks are possible should be considered prime inspection areas. The QAE should become familiar with the effects that gas leaks have on vegetation. Army Technical Manual 5-654 and DOT's Guidance Manual for Operators of Small Gas Systems include material on this subject. In walking or driving over the area served by the gas distribution system, a trained observer can detect any change in the appearance of the plant life that could be caused by a gas leak in the immediate vicinity.

4. Performance Indicator 4. Using the contractor's report of work completed, the QAE and the contractor should visit randomly selected locations where key distribution valves, relief valves, or regulator stations have received annual inspection and maintenance, and verify that the devices operate properly and are free from gas leaks. The contractor's O&M documentation must describe the inspection, maintenance, and recommendations for upgrading, repairing, or replacing these devices, if appropriate. Devices inspected should show evidence of receiving proper care.

5. Performance Indicator 5. Using the contractor's PM report and the 100 percent inspection method outlined in Chapter 2, check to see that all facilities scheduled for PM have been recorded as such on the contractor's PM report. Document the results on the Gas Distribution Maintenance Checklist, and compare them to the contractor's PM report to detect discrepancies.

To perform unscheduled inspections, use the contractor's PM records to determine the facilities to be sampled, including all areas specified by the KO or his/her representative. Schedule the inspection so that the QAE may accompany the contractor during his/her inspection of the facilities. The QAE should use the Army Technical Manual 5-654 and DOT's Guidance Manual for Operators of Small Gas Systems to inspect the distribution system. Document the results of the inspection on the Gas Distribution Maintenance Checklist, and compare them to the contractor's PM report to detect discrepancies. If discrepancies are found, the contractor should include any repair items noted by the QAE on the contractor's next PMI report.

6. Performance Indicator 6. Review the record of repair work on the gas distribution system. Verify that the contractor has responded to the need in a timely manner and has worked diligently to restore service. All tasks must have been done substantially in accordance with Army TM 5-654. The repair site must be clear of construction debris, and excavated areas must be graded to match the surrounding area. An unscheduled return visit to the repair site should show that excavated areas that may have settled have been reshaped and repaired to conform with the surrounding area.

To inspect SOs, use the contractor's report of work completed, and schedule repairs to be randomly sampled. Using the procedures for normal surveillance--4 percent AQL, select the repairs to be inspected. Document the results on the Gas Distribution Maintenance Checklist, and compare them to the work request to detect discrepancies.

To inspect IJOs the QAE should use the 100 percent inspection method and the contractor's report of work completed to schedule all repairs to be inspected. Document the results on the Gas Distribution Maintenance Checklist, and compare them to the work request report to detect discrepancies.

EXAMPLE QA WORKSHEET

GAS DISTRIBUTION

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QUALITY ASSURANCE WORKSHEET (GAS DISTRIBUTION MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all gas distribution system components.

PERFORMANCE INDICATORS:

1. The contractor's documentation for maintenance of the gas distribution system has been submitted on time and is complete.
2. The contractor's PMI reports for all gas distribution systems have been submitted on time and in an acceptable manner. QAE inspection of documentation shows no deficiencies or discrepancies.
3. Random leakage checks made by the QAE verify the contractor's reports.
4. The QAE has observed the annual inspection and maintenance of key valves, relief devices, and regulator stations.
5. The contractor's PM has been performed for all gas distribution systems, and QAE inspection shows no deficiencies or discrepancies.
6. The contracted SO and IJO work was accomplished in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. The QAE inspection results of the facilities sampled for the contractor's report of work completed show no deficiencies in accordance with Army TM 5-654.

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QUALITY ASSURANCE EVALUATION METHODS:

1. A 100 percent inspection method should be used to inspect the completeness of the contractor's reports.
2. The QAE should inspect the contractor's PMI report by a 100 percent inspection method. The QAE should make an unscheduled inspection of areas of poor past performance and those areas specified by the KO or his/her representative.
3. The QAE should use a systematic random sampling method to determine the number of places to be inspected for leaks. Using the population size 583, and referring to Table A1 of Appendix A gives 21 number of samples and 4 number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval 75.
4. The QAE should use a systematic random sampling method to determine the number of valves to be inspected to see that they have been exercised. Using the population size 247, and referring to Table A1 of Appendix A gives 19 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the interval 13.
5. The QAE should use a 100 percent inspection method to inspect the contractor's PM report. He/she should make an unscheduled inspection to areas of poor past performance and those areas specified by the KO or his/her representative.
6. The QAE should use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size 87, and referring to Table A1 of Appendix A gives 17 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval 9. The QAE should use a 100 percent inspection method to inspect all IJO repairs.

GAS DISTRIBUTION

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QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's documentation shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: Random leakage checks made by the QAE verify the contractor's reports.

LOCATION
BLDg 407
" 524 "

QAE REMARKS:

(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

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QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION MAINTENANCE)

REQUIREMENT: The QAE has observed the annual inspection and maintenance of key valves, relief devices, and regulator stations.

LOCATION
VALVE 29
" 42 "
REGULATOR STA. 3

QAE REMARKS:

(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

REQUIREMENT: The QAE's inspection of the contractor's PM report shows no deficiencies.

LOCATION
REPORT FITS SCHEDULE
AS REPORTED PER STA. 2

QAE REMARKS:

(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Page 3 of 3

QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION MAINTENANCE)

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION					
REPAIR DAMAGED REGULATOR	(CIRCLE ONE)	S	U	N	
BLDG 624	(CIRCLE ONE)	S	U	N	
	(CIRCLE ONE)	S	U	N	
	(CIRCLE ONE)	S	U	N	
	(CIRCLE ONE)	S	U	N	
	(CIRCLE ONE)	S	U	N	
	(CIRCLE ONE)	S	U	N	

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Timothy Davis
 Quality Assurance Evaluator

6/25/05
 Date

ELECTRIC SERVICES

A. ELECTRIC SUPPLY STATIONS

B. ELECTRICAL DISTRIBUTION SYSTEMS

A. ELECTRIC SUPPLY STATIONS

Operations

This section pertains to O&M of the following parts of an electrical supply system:

Power transformers
Voltage regulators
Circuit breakers (air, oil, vacuum, gas)
Automatic circuit reclosers (oil, vacuum)
Disconnect switches (single pole and group operated)
Enclosed switches (air, oil, vacuum, gas)
Power fuses
Instrument transformers (current, voltage)
Surge arresters
Capacitor banks
Substation structures and buses
Switchgear and switchboards
Protective relays
Meters
Storage batteries

The following related items are not part of the scope of this section: (see Electrical Distribution Systems):

Overhead distribution lines
Underground cables
Manholes and duct banks
Distribution transformers
Pad-mounted switches
Emergency generators

The contractor's documentation for operation of the electric supply station systems should include, as a minimum, the daily log of operations and conditions and the log of electrical systems outages.

PERFORMANCE INDICATORS

1. The contractor's logs and checklists for electric supply station operation must be complete with dates and include the initials of the person doing the work.

2. The contractor's outage records must be complete with dates, length of outage, cause of outage, and corrective action taken.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's operation activities and then performing the QA evaluation within 3 days. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Electric Supply Station Operation)
2. QA Checklist (Electric Supply Station Operation)

The sample forms provided in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicators 1 and 2 should be evaluated monthly by 100 percent inspection.

DETAILED PROCEDURES

1. Performance Indicator 1. Using the QA checklist, schedule a monthly inspection by the QAE of the contractor's work documentation. Check the reports and logs for completeness against contract requirements in the following areas:

- a. Description of normal operation of the electric supply station, including copies of meter readings.
- b. Reports of corrective actions taken in the event of system outage, equipment failure, overloading, overheating, or other system problems.
- c. Recommended improvements to the electric supply station that will increase its performance, or repairs to damaged or deteriorated components.

The contractor's report should be furnished on forms approved by the KO; all entries must be initiated and dated by the person doing the work. If the reports are incomplete, and the contractor does not justify the omissions (such as supporting schedules for infrequently required operations), documentation should be considered unsatisfactory.

2. Performance Indicator 2. Review outage records monthly, and compare the contractor's performance with historical data. The contractor should prepare and maintain electric system outage records that should include, as a minimum, the following information:

- a. Date and time of outage.
- b. Time outage was reported.
- c. Outage reported by _____.
- d. Report taken by _____.
- e. Portion of system affected.
- f. Repair crew assigned and time.
- g. Repair action taken.
- h. Time service was restored.
- i. Outage cause.
- j. Additional corrective action required or recommended.

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. SUPPLY STATION OPER.)

CONTRACT REQUIREMENT: Operate the electric supply station to provide uninterrupted electrical service.

PERFORMANCE INDICATORS: Use QA Checklist (Electric Supply Station Operation) to record performance.

1. The contractor's logs and checklists for electric supply station operation are complete with dates and include the initials of the person doing the work.
2. The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

QUALITY ASSURANCE EVALUATION METHODS:

Performance indicators 1 and 2 should be evaluated monthly by 100 percent inspection.

QUALITY ASSURANCE CHECKLIST (ELECT. SUPPLY STATION OPER.)

REQUIREMENT: All required documentation is complete and has been submitted on time.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

REQUIREMENT: The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Timothy Davis
Quality Assurance Evaluator

6/25/85
Date

Maintenance

The contractor's activities for electric supply station system maintenance should include a preventive maintenance inspection, preventive maintenance activities, and repairs.

PERFORMANCE INDICATORS

1. The contractor's inspection and maintenance records must be complete, and all sections of the system must be inspected regularly. Necessary work must be identified, and preventive maintenance activity reports must be submitted on time. QAE inspection should show no deficiencies or discrepancies.
2. An on-site inspection of the electric supply station must show that the site's operation and conditions comply with indicators described in the detailed procedures.
3. The contractor's PM must be performed for all electric supply station components, and QAE inspection should show no deficiencies or discrepancies in the detailed procedures.
4. The contracted SO and IJO work must be done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, must be comparable to the facility's original construction quality and appearance. The QAE inspection results of the facilities sampled in comparison to the contractor's report of work completed should show no deficiencies.

Evaluation of the contractor's performance in providing all of these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's maintenance activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Electric Supply Station Maintenance)
2. QA Checklist (Electric Supply Station Maintenance)

The sample forms in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

1. Performance Indicator 1. A 100 percent inspection method should be used to inspect the completeness of the contractor's PMI report. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PMI report.)
2. Performance Indicator 2. The QAE should perform an on-site inspection monthly, using the 100 percent sampling technique. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to inspect less frequently. A quarterly inspection is recommended.)
3. Performance Indicator 3. Initially, a 100 percent inspection method should be used to inspect the completeness of the contractor's PM report and QC checklist. Also, a random field inspection should be used for areas of poor past performance and for areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PM report and QC checklist.)
4. Performance Indicator 4. SOs should be inspected by systematic random sampling. IJOs should be checked by the 100 percent inspection method to determine contractor performance.

GENERAL PROCEDURES

1. Performance Indicator 1. Using the contractor's PMI report and the 100 percent inspection procedures outlined in Chapter 2, check to see that all facilities scheduled for a PMI have been recorded as such on the contractor's PMI report. The results should be well documented on the Electric Supply Station Maintenance Checklist and should be compared to the contractor's PMI report to detect discrepancies.

2. Performance Indicator 2. Schedule the inspection so that the QAE may accompany the contractor. The QAE should use the Detailed Procedures to measure contractor performance and document the results on the Electric Supply Station Maintenance Checklist. The inspection results should be compared to the contractor's PMI report to detect discrepancies. If discrepancies are found, the contractor should include those repair items noted by the QAE on his/her PMI report.

3. Performance Indicator 3. Using the contractor's PM report and the 100 percent inspection method, check to see that all facilities scheduled for PM have been recorded as such on the contractor's PM report. The results should be documented on the Electric Supply Station Maintenance Checklist and compared to the contractor's PM report to detect discrepancies.

Using the record of problem areas, systematic random sampling procedures, and normal surveillance--10 percent AQL, select the areas to be inspected. The QAE should use the Detailed Procedures to measure the contractor's performance. The results should be documented on the Electric Supply Station Maintenance Checklist and compared to the contractor's PM report to detect discrepancies.

4. Performance Indicator 4. Use the contractor's report of work completed to inspect SOs, and schedule those repairs for random sampling. Using the random sampling procedures outlined in Chapter 2 (normal surveillance, 4 percent AQL), select the repairs to be inspected. Document the results on the Electric Supply Station Maintenance Checklist, and compare them to the work request to detect discrepancies.

Use the contractor's report of work completed to schedule 100 repairs for inspection. Check the repairs using the 100 percent inspection method, and document on the Electric Supply Station Maintenance Checklist. Compare the results to the work request report to detect discrepancies.

DETAILED PROCEDURES

1. Performance Indicator 1. No detailed instructions.

2. Performance Indicator 2. Visit the electric supply station monthly and evaluate the contractor's operation of the plant using the following general approach:

a. General. The overall appearance of the buildings, yard, and grounds should be attractive. Grassed areas around the building should be mowed and trimmed.

b. Painting and Galvanizing. Building and steel structures should be painted or galvanized and free of rust and peeling, deteriorated paint. Equipment tanks and enclosures should be painted or galvanized and rust-free.

c. Fence. Fence and gates should be secure and intact, with danger signs in place.

d. Surfacing. Crushed rock surfacing in yard should be clean and complete.

e. Oil leaks. There should be no evidence of oil leaks in the equipment.

f. Grounding System. Ground leads should be intact and properly supported.

g. Porcelain. Porcelain bushings and insulators should be clean and free of chips or broken areas.

h. Buses and Conductors. There should be no bird nests or foreign material on or near energized conductors or in transformer radiators.

i. Oil Levels. Oil levels and temperatures in equipment should be within acceptable limits.

j. Lighting. All lamps should be operable.

k. Switchgear and Switchboards. Area around switchboards should be clean. Indicating lights should match position shown on circuit-breaker indicating targets. Targets on protective relays should be reset.

1. Circuit Breaker Counters. Counter readings should correspond to readings on log sheets.

m. Battery. Battery area should be clean, and electrolyte levels should be within acceptable limits.

3. Performance Indicator 3. Review the contractor's PM reports annually. A PM program should be established for each item of equipment and should provide the following:

- a. Description of the specific maintenance program.
- b. Date when maintenance was performed and date (or other milestone) when it should next be performed.
- c. Special procedures or requirements to be followed.
- d. Sampling and testing requirements for insulating oil.
- e. Infrared inspection of buses and connections.

Compare the frequency and cost of required repairs with historical records of the electric supply station to further evaluate the contractor's effectiveness. For example, try to find out how often equipment has been replaced or rebuilt in the past and compare it with the current need for the same repair. If the interval between repairs has decreased, notify the COR. If historical data are not available, start a file on each major piece of equipment so there will be a repair record for future reference.

Accurate and complete property records are essential for proper evaluation of PM programs. Continuing property records should include, as a minimum, the following:

- a. Description of item and location.
- b. Manufacturer, type, serial number.
- c. Ratings.
- d. Date installed.
- e. Tests performed at installation.
- f. Description and date of any subsequent tests, maintenance, repairs, etc.

4. Performance Indicator 4. Visit the site of the selected repair to verify that the work is being performed so as to minimize service interruptions. After completion of repair work, the construction area must be cleared of debris and excavated areas graded to match the surrounding area. An unscheduled visit to the site later should show whether settled excavated areas have been reshaped.

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. SUPPLY STATION MAINT.)

CONTRACT REQUIREMENT: Perform maintenance activities for all electrical supply station components.

PERFORMANCE INDICATORS:

1. The contractor's inspection and maintenance records are complete and all sections of the system are inspected regularly. Necessary work is identified, and preventive maintenance activity reports have been submitted on time. QAE inspection shows no deficiencies or discrepancies.
2. An on-site inspection of the electric supply station shows that the site's operation and conditions comply with indicators described in the detailed procedures.
3. The contractor's PM has been performed for all electrical supply station components, and QAE inspection shows no deficiencies or discrepancies according to the detailed procedures.
4. The contracted SO and IJO work has been done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. Comparison of the QAE inspection results with the contractor's report of work completed shows no deficiencies.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should inspect the contractor's PMI report by a 100 percent inspection method. Poor past performance areas and those areas specified by the Contracting Officer or his/her representative should be checked by an unscheduled inspection method.
2. The QAE should inspect the performance of the contractor's PMI by using a 100 percent sampling method.

3. The QAE should check contractor's PM report by a 100 percent inspection method. A systematic random inspection method should be used to determine the facilities to be inspected. Using the population size 36, and referring to Table A1 of Appendix A gives 15 number of samples and 4 number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval 2.

4. The QAE should use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size 250, and referring to Table A1 of Appendix A gives 19 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval 13. A 100 percent inspection method should be used to inspect all IJO repairs.

ELECTRIC SUPPLY STATIONS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. SUPPLY STATION MAINT.)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's on-site inspection of the electric supply station shows no deficiencies.

LOCATION
STATION 2 (CIRCLE ONE) S U N
STATION 5 (CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

QAE REMARKS:

*EXTERNAL LIGHTING FIXTURE NOT OPERATING
AND SCHEDULED FOR REPAIR*

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION
STATION 2 (CIRCLE ONE) S U N
STATION 5 (CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

QAE REMARKS:

TRANSFORMER LEAKING

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. SUPPLY STATION MAINT.)

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION
STATION 1 - X-MIFE REPL. (CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Spun Nylon
Quality Assurance Evaluator
6/26/85
Date

B ELECTRICAL DISTRIBUTION SYSTEMS

This section provides information needed to inspect O&M of the following electrical distribution system parts:

Overhead distribution lines
Underground cables
Manholes and duct banks
Distribution transformers
Pad-mounted equipment

Evaluation should be scheduled by determining when the contractor intends to complete his/her documentation of the previous month's O&M activities. The QA evaluation should be scheduled within 3 days of report receipt. Proper coordination will allow the QAE to inspect all electrical distribution system services at one time. Recommended methods and detailed procedures for the evaluations are described separately in the following sections.

CONTRACT REQUIREMENTS SUMMARY

1. Maintenance Management

a. Work Control. Maintain daily schedule and annual maintenance schedule; receive and schedule work requests; maintain filing and recording system; prepare documentation or markup drawings; keep an inspection log.

b. Project Planning. Schedule and complete work items.

c. Maintain Equipment Files. Include manufacturer's literature, warranty information, and maintenance and repair history.

d. GFE Files. Maintain equipment files on each accountable item.

e. Quality Control. Provide evidence of effective quality control to ensure that all work meets contract requirements.

2. Equipment Operation. Maintain operating logs and operating log file for a minimum of 5 years.

3. Equipment Maintenance. Maintain the parts of the electrical distribution system (listed above) in the scope of work.

4. Contractor Reports

- a. Quality control plan
- b. Inspection logs
- c. Maintenance data
- d. Inventory listings
- e. Markup drawings
- f. Warranty data.

Operations

The contractor's documentation for operation of the electrical distribution systems should include, as a minimum, the daily log of operations and conditions, the log of electrical system outages, and the generator fuel report.

PERFORMANCE INDICATORS

1. The contractor's inspection and operation records for electric distribution equipment must be complete with dates and include the initials of the person doing the work.

2. The contractor's outage records must be complete with dates, length of outage, cause of outage, and corrective action taken.

3. The contractor should have exercised the auxiliary generators and auxiliary power operations.

4. The contractor should have exercised the automatic start and load assumption cycles.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's operation activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Electrical Distribution Operation)
2. QA Checklist (Electrical Distribution Operation)

The sample forms provided in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicators 1 and 2 should be evaluated monthly by 100 percent inspection. Performance indicator 3 should be evaluated by unscheduled inspection, and performance indicator 4 should be evaluated quarterly on a 100 percent basis.

DETAILED PROCEDURES

1. Performance Indicator 1. Using the QA checklist, schedule monthly inspection of the contractor's work documentation. Check reports and logs for completeness against contract requirements in the following areas:
 - a. Description of normal inspection, maintenance, and operation of the electric distribution equipment.
 - b. Reports of corrective actions taken in the event of system outage, equipment failure, overloading, overheating, or other system problems.
 - c. Recommended improvements that will increase system performance, or repairs to damaged or deteriorated components.
 - d. Copies of completed work orders.

Retrieve all of the contractor's documentation since the last evaluation and examine the daily log to identify possible deficiencies such as extreme power level shifts and questionable data. Check the generator fuel report to see that the quantity of fuel is correct and that the water content is acceptable in accordance with the standard operating procedures.

The contractor's reports should be furnished on forms approved by the KO; all entries must be initialed and dated by the person doing the work. If the reports are incomplete and the contractor does not justify the omissions (such as supporting schedules for infrequently required operations), documentation should be considered unsatisfactory. Document the results of this inspection on the Electrical Distribution Operation Checklist, and note any discrepancies.

2. Performance Indicator 2. Review outage records monthly and compare the contractor's performance with historical data. The contractor should prepare and maintain electric system outage records that include, as a minimum, the following information:

- a. Date and time of outage
- b. Time outage was reported
- c. Outage reported by _____
- d. Report taken by _____
- e. Portion of system affected
- f. Repair crew assigned and time
- g. Repair action taken
- h. Time service was restored
- i. Outage cause
- j. Additional corrective action required or recommended.

3. Performance Indicator 3. Check the contractor's exercising of the auxiliary generators and auxiliary power operation by an unscheduled inspection. To evaluate exercising of the auxiliary generators, observe the contractor's testing. To evaluate the exercising of the auxiliary power operations, monitor the contractor's procedures. Document the results on the Electrical Distribution Operation Checklist, and note any discrepancies.

4. Performance Indicator 4. Use the 100 percent inspection method to check the contractor's performance in exercising the automatic start and load assumption cycle. Upon receipt of the contractor's schedule to perform this task, accompany the contractor and monitor his/her procedures. Document the results on the Electrical Distribution Operation Checklist, and note any deficiencies.

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. DIST. OPERATION)

CONTRACT REQUIREMENT: Operate the electrical distribution systems to provide uninterrupted electrical service.

PERFORMANCE INDICATORS: Use QA Checklist (Electrical Distribution Operation) to record performance.

1. All required documentation is complete and has been submitted on time.
2. The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.
3. The contractor has exercised the auxiliary generators and auxiliary power operations.
4. The contractor has exercised the automatic start and load assumption cycles.

QUALITY ASSURANCE EVALUATION METHOD:

Performance indicators 1 and 2 should be evaluated monthly by 100 percent inspection. Performance indicator 3 should be evaluated by unscheduled inspection, and performance indicator 4 should be evaluated quarterly on a 100 percent basis.

ELECTRIC SUPPLY STATIONS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. OPERATION)

REQUIREMENT: All required documentation is complete and has been submitted on time.

(CIRCLE ONE) S U N

QAE REMARKS:

REQUIREMENT: The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

(CIRCLE ONE) S U N

QAE REMARKS:

REQUIREMENT: The contractor has exercised the auxiliary generators and auxiliary power operations.

LOCATION	GENERATOR	STA.	2	(CIRCLE ONE)	S	U	N
"	"	"	3	(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
"	"	"	5	(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
"	"	"	6	(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>

QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. OPERATION)

REQUIREMENT: The contractor has conducted exercises of the automatic start and load assumption cycles.

LOCATION	GENERATOR	STA.	1	(CIRCLE ONE)	S	U	N
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>
				(CIRCLE ONE)	<u>S</u>	<u>U</u>	<u>N</u>

QAE REMARKS:

No other stations scheduled this month

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

James Thomas
Quality Assurance Evaluator
Date 6/26/85

Maintenance

The contractor's activities for maintenance of electrical distribution systems should include a preventive maintenance inspection, preventive maintenance activities, and repairs.

PERFORMANCE INDICATORS

1. The contractor's inspection and maintenance records must be complete, and all sections of the system must be inspected regularly. Necessary work must be identified, and preventive maintenance activity reports must be submitted on time. QAE inspection should show no deficiencies or discrepancies.

2. An on-site inspection of the electric distribution system must show that the site's operation and conditions comply with indicators described in the Detailed Procedures.

3. The contractor's PM must be performed for all electrical distribution system components. QAE inspection should show no deficiencies or discrepancies in regard to the Detailed Procedures.

4. The contracted SO and IJO work must be done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, must be comparable to the facility's original construction quality and appearance. The QAE inspection should show no deficiencies when compared to the contractor's report of work.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's maintenance activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Electrical Distribution Maintenance)
2. QA Checklist (Electrical Distribution Maintenance)

The sample forms included within this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

1. Performance Indicator 1. A 100 percent inspection method should be used to check the completeness of the contractor's PMI report. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PMI report.)

2. Performance Indicator 2. The QAE should perform an on-site inspection monthly, using the systematic random sampling technique. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to inspect less frequently. A quarterly inspection is recommended.)

3. Performance Indicator 3. Initially, a 100 percent inspection method should be used to check the completeness of the contractor's PM report and QC checklist. Also, a random field inspection should be used for areas of poor past performance and areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PM report and QC checklist.)

4. Performance Indicator 4. SOs should be inspected using a systematic random sampling procedure, and IJOs should be inspected by a 100 percent inspection method.

GENERAL PROCEDURES

1. Performance Indicator 1. Using the contractor's PMI report and the 100 percent inspection procedures outlined in Chapter 2, check to see that all facilities scheduled for a PMI have been recorded as such on the contractor's PMI report. The results should be documented on the Electrical Distribution Maintenance Checklist and should be compared to the contractor's PMI report to detect discrepancies.

2. Performance Indicator 2. To perform the systematic random inspection, use the contractor's PMI records to determine the facilities to be sampled, including areas of poor past performance and areas specified by the KO or his/her representative. Schedule the inspection so that the QAE may accompany the contractor during his/her inspection of the scheduled facilities. The QAE should use the Detailed Procedures to measure contractor performance. Document the inspection results on the Electrical Distribution Maintenance Checklist, and compare them to the contractor's PMI report to detect discrepancies. If discrepancies are found, the contractor should include any repair items noted by the QAE on his/her PMI report.

3. Performance Indicator 3. Using the contractor's PM report and the 100 percent inspection method, check to see that all facilities scheduled for PM have been recorded as such on the contractor's PM report. The results should be documented on the Electrical Distribution Maintenance Checklist and compared to the contractor's PM report to detect discrepancies.

Using the record of problem facilities, systematic random sampling procedures, and normal surveillance--10 percent AQL, select the units to be inspected. The QAE should use the Detailed Procedures to measure the contractor's performance. Results should be documented on the Electrical Distribution Maintenance Checklist and compared to the contractor's PM report to detect discrepancies.

4. Performance Indicator 4. Use the contractor's report of work completed to inspect SOs, and schedule those repairs to be randomly sampled. Using the random sampling procedures outlined in Chapter 2 (normal surveillance, 4 percent AQL), select the repairs to be inspected. The results should be documented on the Electrical Distribution Maintenance Checklist and compared to the work request to detect discrepancies.

To inspect IJOs use the 100 percent inspection method and the contractor's report of work completed to schedule all repairs to be inspected. The results should be documented on the Electrical Distribution Maintenance Checklist and compared to the work request report to detect discrepancies.

DETAILED PROCEDURES

1. Performance Indicator 1. No detailed instructions

2. Performance Indicator 2. Proper inspection and maintenance records should reveal the condition of the distribution system and whether the level of maintenance is adequate. Thus, the contractor should establish a specific method of recording data on a form that indexes inspection sheets to map locations and a maintenance log to document inspection maintenance and repairs.

The following items illustrate work that the contractor should be performing during a preventive maintenance inspection. The QAE should randomly pick sections of the distribution system to evaluate contractor performance in these areas.

a. Poles. Poles should be plumb or straight. Tops of the poles should be inspected for areas that have cracked or split due to lightning or improper guying. Pole butts should be inspected for split, rotten, or decaying wood. It may sometimes be desirable to inspect at or below the ground line for ground line rot.

b. Right-of-Way. There should be sufficient horizontal and vertical clearance from the primary and secondary conductors. Trees or shrubs may need to be cleared or trimmed.

c. Anchor and Guys. Guys should be tight, and the pole attached to the guys should either be straight or lean slightly into the direction of the guy and anchor. Guy strands should be unrusted, and strands should not be broken. Anchor rods should be about 6 in. to 1 ft above the ground. Anchor rods below the ground will eventually cause the guy strand to rust. Anchor rods too far out of the ground will decrease the strength of the guy and anchor. Guy guards should be installed where there is potential for pedestrian traffic. In a grounded neutral system, the guy should be bonded to the system neutral. A delta system should have insulators in all guys.

d. Pole Top Assemblies. If the pole top assembly contains a cross-arm, the cross-arm should be horizontal and at a right angle to the pole. Braces supporting the cross-arm should be tight and unbroken, and insulator pins on angle structures should be straight. Insulators should not be chipped or broken. Hardware should be kept tight with lock nuts; if loosened, it will cause radio noise.

e. Grounds. Grounds should be stapled tightly to the pole and should not be loose, broken, or have broken strands.

f. Primary Conductor. Conductors should have adequate clearance to ground and should have even sag for each of the conductors. (Sags that differ greatly may indicate that splices were installed and that the wires were tensioned too tightly.) There should be no broken wire strands on the conductor. The conductor should be tightly tied or bolted to the insulators.

g. Secondary Conductor and Services. Span lengths of the secondary conductor should not be excessive. Insulation should adhere tightly to the conductor.

h. Reclosers, Sectionalizers, Transformers, Regulators, Capacitors. All of these items make up a large part of the distribution system investment. It is recommended that cards or similar records be kept that completely describe these units. Data that should be included would be original cost, location, ratings, tests, and maintenance performed. Jumpers that connect the equipment should have enough clearance from the pole (a minimum of 9 in. for 7200-V systems).

i. Underground Equipment. Transformers and pad-mounted equipment should be level, and trenches should be filled. All equipment should be padlocked to keep unauthorized personnel out of the enclosures. Underground risers should have a cable guard, the cable should be supported, and guy wire should be clear of the energized conductor. Enclosures should be free from rust and corrosion damage. Warning signs should be installed along the cable route and on pad-mounted equipment.

3. Performance Indicator 3. Review the contractor's PM reports, which should be revised annually. A PM program to provide the following should have been established by the contractor for each major category of equipment:

a. Systematic inspection and documentation of findings.

b. Description of specific maintenance programs based on the inspection findings.

c. Job documents defining the necessary work, priorities, and related information.

d. Date when maintenance was performed and date (or other milestone) when it should be performed next.

e. Special procedures or requirements to be followed.

Compare the frequency and cost of required repairs with historical records of the electric distribution system to further evaluate the contractor's effectiveness. For example, try to find out how often equipment has been repaired, replaced, or rebuilt in the past and compare it with the current need for the same repair. If the interval between repairs has decreased, notify the COR. If historical data are not available, start a file on each major category of equipment so there will be a repair record for future reference.

Accurate and complete property records are essential for proper evaluation of PM programs. Continuing property records should include, as a minimum, the following:

- a. Description of item and location.
- b. Manufacturer, type, serial number, etc.
- c. Ratings.
- d. Date installed.
- e. Tests performed.
- f. Description and date of any subsequent tests, maintenance, repairs, etc.

4. Performance Indicator 4. Visit the site of the selected repair to verify that the work is being performed to minimize service interruptions. After completion of repair work, the construction area must be cleared of debris and excavated areas graded to match the surrounding area. An unscheduled visit to the site later should show whether settled excavated areas have been reshaped.

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. DIST. MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all electrical distribution system components.

PERFORMANCE INDICATORS:

1. The contractor's inspection and maintenance records are complete, and all sections of the system are inspected regularly. Necessary work is identified and preventive maintenance activity reports have been submitted on time. QAE inspection shows no deficiencies or discrepancies.
2. On-site inspection of the electric distribution plant shows that the site's operation and conditions comply with indicators described in the Detailed Procedures.
3. The contractor's PM has been performed for all electrical distribution system components, and QAE inspection shows no deficiencies or discrepancies in accordance with the Detailed Procedures.

4. The contracted SO and IJO work is done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. When compared to the contractor's report of work completed, the QAE inspection results of the facilities show no deficiencies.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should check the contractor's PMI report by a 100 percent inspection method. The QAE should inspect areas of poor past performance and those areas specified by the KO or his/her representative using an unscheduled inspection method.
2. The contractor's PMI should be inspected by a systematic random sampling method. Using the population size 50, and referring to Table A1 of Appendix A gives 15 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 3.

3. A 100 percent inspection method should be used to inspect the contractor's PM report. The QAE should use a systematic random inspection method to determine the facilities to be inspected. Using the population size 50, and referring to Table A1 of Appendix A gives 15 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 3.

4. The QAE shall use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size 50, and referring to Table A1 of Appendix A gives 15 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 3. The QAE should use a 100 percent inspection method to check all IJO repairs.

ELECTRIC SUPPLY STATIONS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's on-site inspection of the electrical distribution plant shows no deficiencies.

LOCATION
B-4 (CIRCLE ONE) S U N
C-4 (CIRCLE ONE) S U N
D-3 (CIRCLE ONE) S U N
E-3 (CIRCLE ONE) S U N
F-3 (CIRCLE ONE) S U N
G-3 (CIRCLE ONE) S U N
H-3 (CIRCLE ONE) S U N
I-3 (CIRCLE ONE) S U N

QAE REMARKS:

detriorated & broken cross-arm on pole #17646 (not found in PMI)

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION
A-2 (CIRCLE ONE) S U N
A-3 (CIRCLE ONE) S U N
A-4 (CIRCLE ONE) S U N
B-1 (CIRCLE ONE) S U N
B-2 (CIRCLE ONE) S U N
B-3 (CIRCLE ONE) S U N
B-4 (CIRCLE ONE) S U N
C-1 (CIRCLE ONE) S U N
C-2 (CIRCLE ONE) S U N

QAE REMARKS:

Guy anchor cable frayed and worn half through - should have been replaced

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. MAINTENANCE)

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION
D-3 (CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N
(CIRCLE ONE) S U N

QAE REMARKS:

primary conductor span spliced and replaced after tree fell - service restored in 4 hours

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

James Thomas
Quality Assurance Evaluator

6/29/05
Date

HEATING SYSTEMS AND RELATED FACILITIES OPERATIONS

This section provides information for inspecting O&M of the following parts of a complete heating system and related facilities: heating distribution systems, incinerators, and laundry facilities.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor will complete documentation of the previous month's O&M activities. The QA evaluation should be scheduled within 3 days of report receipt. Proper coordination will allow the QAE to inspect all heating systems and related facility services at one time. Recommended methods and detailed procedures for the evaluations are described separately in the following sections.

HEATING SYSTEMS AND RELATED FACILITIES OPERATIONS

The contractor's documentation for operation of heating systems should include, as a minimum, the following: daily log of operations and conditions, fuel storage and accounting report, and water treatment form.

PERFORMANCE INDICATORS

1. All required documentation must be submitted on time and in an acceptable manner.
2. The output pressure of the steam from the boiler must be in accordance with the installation's standard operating procedures.
3. The contractor must report all operational emergencies within 30 minutes.
4. The contractor must alleviate all emergency situations within 2 hours.
5. As necessary or at the request of the COR, a deactivated boiler must be brought on-line within 8 hours.
6. The contractor must operate the incinerator during the period identified in the contract.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's operation activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Heating Systems Operation)
2. QA Checklist (Heating Systems Operation)
3. Standard Operating Procedures for Heating Systems.

The sample forms provided in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicator 1 should be evaluated monthly by 100 percent inspection by checking all of the contractor's documentation. Performance indicators 2, 3, and 4 should be evaluated weekly by 100 percent inspection of the strip record of measured pressures. Performance indicator 5 should be evaluated by a planned sampling of the work as it is completed. Performance indicator 6 should be evaluated by an unscheduled inspection made during incinerator operating hours and supplemented by validated complaints.

DETAILED PROCEDURES

Retrieve all the contractor's documentation since the last evaluation. Evaluate the daily log, fuel storage and accounting report, and the operating log for boiler water treatment monthly.

Examine the daily log to identify possible deficiencies in operation such as drops in output pressure and questionable data. The fuel storage and accountability report should be checked to see that it includes reports of fuel consumed, quantity remaining, and water content. Note any deviations from the norm so that the COR may review them and ask the contractor for explanation or justification. Check the water treatment log for completeness; if necessary, check the report against the standards outlined in TM 650.

Examine the strip record of measured operating pressures to see that the pressures indicated meet but do not exceed the acceptable pressures stated in the installation's standard operating procedures. If any of the pressure readings are unacceptable, note the date, time, pressure, and date and time that proper pressure was restored. Check to see that pressure losses lasting for more than 30 minutes were reported to the COR within 30 minutes of their occurrence. Also check to see that the pressure has been restored within 2 hours. The contractor should have responded in a timely manner to reports of loss of heat and have corrected the problem within 2 hours.

When informed of boiler re-activation, check to see that the boiler has been brought on-line in 8 hours. If the boiler was activated because of an emergency, check the contractor's report to determine compliance.

To check the contractor's performance in operating the incinerator, visit the facility, as necessary, during its operating hours. Supplement this information with validated complaints from personnel who have found the facility closed during operating hours.

EXAMPLE QA WORKSHEET

HEATING SYSTEMS AND RELATED FACILITIES QUALITY ASSURANCE WORKSHEET (HEATING SYSTEMS OPERATION)

CONTRACT REQUIREMENT: Operate the heating systems.

PERFORMANCE INDICATORS. (Use the QA Checklist [Heating Systems Operation] to record performance.)

1. All required documentation has been submitted on time and in an acceptable manner.
2. The output pressure of the steam from the boiler conforms to the installation's standard operating procedures.
3. The contractor has reported all operational emergencies within 30 minutes.
4. The contractor has alleviated all emergency situations within 2 hours.
5. As necessary, or at the request of the COR, a deactivated boiler has been brought on-line within 8 hours.
6. The contractor has operated the incinerator during the period identified in the contract.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicator 1 should be evaluated monthly by 100 percent inspection. Performance indicators 2, 3, and 4 should be evaluated weekly by 100 percent inspection of the strip record of measured pressures. Performance indicator 5 should be evaluated by a planned sampling of the work as it is completed. Performance indicator 6 should be evaluated by an unscheduled inspection during incinerator operating hours and supplemented by validated complaints.

HEATING SYSTEMS AND RELATED FACILITIES

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (HEATING SYSTEMS OPERATION)

REQUIREMENT: All required documentation has been submitted on time and in an acceptable manner.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

REQUIREMENT: The output pressure of the steam from the boiler conforms to the Standard Operating Procedures.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

REQUIREMENT: The contractor has reported all operational emergencies within 30 minutes.

(CIRCLE ONE) S ☒ U ☒ N
QAE REMARKS:

no emergencies

REQUIREMENT: The contractor has alleviated all emergency situations within 2 hours.

(CIRCLE ONE) S ☒ U ☒ N
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (HEATING SYSTEMS OPERATION)

REQUIREMENT: As necessary or at the request of the COR, a deactivated boiler has been brought on-line within 8 hours.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

Boiler + on-line 5 hours after need was identified

REQUIREMENT: The contractor has operated the incinerator during the period identified in the contract.

(CIRCLE ONE) ☒ S ☐ U ☐ N
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Robert Evans
Quality Assurance Evaluator
Date *4/29/85*

Maintenance

The contractor's activities for the maintenance of heating systems should include a preventive maintenance inspection, preventive maintenance, and repairs.

PERFORMANCE INDICATORS

1. The contractor's PMI reports for boilers, distribution systems, incinerators, mechanical rooms, and laundry support equipment must be submitted on time and in an acceptable manner. QAE inspection of documentation must not show any deficiencies or discrepancies.
2. The contractor's PM must be performed for boilers, distribution systems, incinerators, mechanical rooms, and laundry support equipment. QAE inspection must not show any deficiencies or discrepancies in comparison to the Detailed Procedures.
3. The contracted SO and IJO work must be done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, must be comparable to the facility's original construction quality and appearance. In comparison to the contractor's report of work completed, the QAE inspection results of the facilities sampled must not show any deficiencies.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's maintenance activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described in the following sections.

INSPECTION FORMS

1. QA Worksheet (Heating Systems Maintenance)
2. QA Checklist (Heating Systems Maintenance)

The sample forms provided in this section show how to use the blank forms provided in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

1. Performance Indicator 1. A 100 percent inspection method should be used to check the completeness of the contractor's PMI report. Unscheduled field inspection should be used for areas of poor past performance and areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PMI report.)
2. Performance Indicator 2. Initially, a 100 percent inspection method should be used to inspect the completeness of the contractor's PM report and QC checklist. Also, a random field inspection should be used for areas of poor past performance and areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PM report and QC checklist.)
3. Performance Indicator 3. SOs should be inspected using a systematic random sampling procedure. A random field inspection should be used for areas of poor past performance and areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. IJOs should be inspected using a 100 percent inspection method.

GENERAL PROCEDURES

1. Performance Indicator 1. Using the contractor's PMI report and the 100 percent inspection procedures outlined in Chapter 2, check to see that all facilities scheduled for a PMI have been recorded as such on the contractor's PMI report. The results should be documented on the Heating Systems Maintenance Checklist and should be compared to the contractor's PMI report to detect discrepancies.

To perform the unscheduled inspection, use the contractor's PMI records, and determine the facilities to be sampled, including areas of poor past performance and areas specified by the KO or his/her representative. Schedule the inspection so that the QAE can accompany the contractor during his/her inspection of the scheduled facilities. Document the results of the inspection on the Heating Systems Maintenance Checklist. Compare the results of the inspection to the contractor's PMI report to detect discrepancies. If discrepancies are found, the contractor should include those repair items noted on his/her PMI report.

2. Performance Indicator 2. Using the contractor's PM report and the 100 percent inspection method, check to see that all facilities scheduled for PM have been recorded on the contractor's PM report. Document the results on the Heating Systems Maintenance Checklist and compare them to the contractor's PM report to detect discrepancies.

Using the record of problem facilities and the systematic random sampling procedures (normal surveillance, 10 percent AQL), select the units to be inspected. Document the results on the Heating Systems Maintenance Checklist, and compare them to the contractor's PM report to detect discrepancies.

3. Performance Indicator 3. To inspect service orders, use the contractor's report of work completed, and schedule those repairs to be randomly sampled. Using the random sampling procedures outlined in Chapter 2 of this report (normal surveillance, 4 percent AQL), select the repairs to be inspected. Document the results on the Heating Systems Maintenance Checklist, and compare them to the work request to detect discrepancies.

To inspect IJOs use the 100 percent inspection method and the contractor's report of work completed to schedule the repairs to be inspected. Document the results on the Heating Systems Maintenance Checklist, and compare them to the work request report to detect discrepancies.

DETAILED PROCEDURES

Heating Plants and Systems

Check to see that:

1. Boiler and furnace rooms are clean and are free of hazardous conditions.
2. Area around heaters is free of fire hazards such as oil spills or other combustible material.
3. There are no accumulations of soot or flyash in smoke breeching and flues that exceed a thickness of 1/2 in. at a point 1 ft below the building roof.
4. Electric motors are securely fastened and correctly aligned.
5. Electric motors are properly lubricated.
6. Openings around vents in oil storage tanks are clear.
7. There are no leaks in storage tanks.
8. Combustion air openings and grills are free of obstructions and allow adequate air flow to the heater combustion chamber.
9. Combustion chambers show no evidence of breakage or damage.
10. Burners do not flash back, which would indicate a need for change or adjustment.
11. Accessories, fittings, and controls are operating properly.
12. Electronic combustion safeguards are functioning properly.
13. Control devices:
 - a. The float and lever system produces a force great enough to operate regulating valves.
 - b. Leaks and accumulation of scale are not present in float controls.
 - c. Pressure controls and reducing valves show no signs of corrosion, wear, or pitting.
 - d. There is no sign of leakage in gas thermometer systems.

14. Equipment is lubricated properly and regularly to prevent metal-to-metal contact, eliminate wear, and reduce corrosion.
15. Electrical equipment (motors and generators) are free of dirt, vibration, misalignment, restricted air circulation, or overload.
16. Boilers are free of leaks. Water sides are free of scale and sludge, and gas sides are free of soot and carbon accumulations.
17. Steam and hot water distribution system:
 - a. Condensate or vacuum pumps show no signs of leaking.
 - b. Proper temperature is maintained in converters on heat exchangers. There is no coil leakage.
 - c. Piping shows no evidence of leakage or loose insulation.
 - d. Valves are opening and closing properly.
18. Condensate tanks are clean, with no accumulated debris or leaks.
19. There are no visible leaks from any system components.
20. All insulation is dry.
21. No parts are broken, warped, damaged, distorted, or burned.
22. All nuts, bolts, and holding parts are tight.
23. Oil pressure is at the required value.
24. Oil level is at the proper level.
25. All hoses and flexible connections are in good condition.
26. All parts move freely and are functioning properly.
27. Pressure controls are operating properly.
28. There are no signs of rusting or corrosion of any part of the heating system.

29. Bearings are cool and well-lubricated.
30. There are no steam or water leaks.
31. Operation is smooth (check by feel and sound).
32. Belts are properly adjusted and are not frayed, worn, or cracked.
33. Readings on gauges compare to those on previous records.
34. There are no changes from the normal sound of operation.

Gas-Fired, Forced-Warm-Air Furnaces:

Check to see that:

1. The air/fuel mixture is proper.
2. Mixer and burner ports are clean.
3. The pilot flame or thermocouple is properly adjusted.
4. There are no carbon monoxide leaks.
5. The air shutter is clean and properly adjusted.
6. There are no gas leaks.
7. The regulator provides the proper gas flow.
8. The air filter is not overly dirty.
9. Recirculating fan/motor belts are not deteriorated.
10. The motor works properly.
11. The thermostat maintains the appointed temperature.
12. Registers, louvers, etc., are not broken or damaged.

EXAMPLE QA WORKSHEET

HEATING SYSTEMS AND RELATED FACILITIES

QUALITY ASSURANCE WORKSHEET (HEATING SYSTEM MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all heating system components.

PERFORMANCE INDICATORS:

1. The contractor's PMI reports for boilers, distribution systems, incinerators, mechanical rooms, and laundry support equipment have been submitted on time and in an acceptable manner. QAE inspection of documentation shows no deficiencies or discrepancies.
2. The contractor's PM has been performed for boilers, distribution systems, incinerators, mechanical rooms, and laundry support equipment. QAE inspection shows no deficiencies or discrepancies in comparison to the Detailed Procedures.
3. The contracted SO and IJO work has been done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the original facility's construction quality and appearance. In comparison to the contractor's report of work completed, the QAE inspection results of the facilities sampled show no deficiencies.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should inspect the contractor's PMI report by a 100 percent inspection method. Areas of poor past performance and areas specified by the KO or his/her representative should be checked by unscheduled inspection.
2. The QAE should use a 100 percent inspection method to check the contractor's PM work and should use a systematic random inspection method to determine the facilities to be inspected. Using the population size 2146, and referring to Table A1 of Appendix A gives 21 number of samples and 4 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 102.
3. The QAE should use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size 242, and referring to Table A1 of Appendix A gives 19 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 13. The QAE should use a 100 percent inspection method to inspect all IJO repairs.

HEATING SYSTEMS AND RELATED FACILITIES

QUALITY ASSURANCE CHECKLIST (HEATING SYSTEM MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N

QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
Bldg 1407	(CIRCLE ONE)	S	U	N
" 1127	(CIRCLE ONE)	S	U	N
" 418	(CIRCLE ONE)	S	U	N
" 637	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N

QAE REMARKS:

electric motor squealing - no evidence of lubrication

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
Bldg 942 - replace pump	(CIRCLE ONE)	S	U	N
" B67 - furnace blower	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N
	(CIRCLE ONE)	S	U	N

QAE REMARKS:

replaced heat is loose and slipping

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Harriet Sanders
Quality Assurance Evaluator

4/29/85
Date

VENTILATION, AIR CONDITIONING, AND REFRIGERATION

A. OPERATIONS

B. MAINTENANCE

This section provides information needed to inspect O&M ventilation, air-conditioning, and refrigeration (VACR) system components.

Evaluation should be scheduled by determining when the contractor intends to complete documentation of the previous month's O&M activities. The QA evaluation should be scheduled within 3 days of report receipt. Proper coordination will allow the QAE to inspect all VACR system services at one time. Recommended methods and detailed procedures for the evaluations are described separately in the following sections.

A. OPERATIONS

The contractor's documentation for operation of cooling systems should include, as a minimum, the daily log of operations and conditions.

PERFORMANCE INDICATORS

1. All required documentation must be complete and must be submitted on time.
2. General-purpose rooms must be kept at ambient temperatures of approximately 78°F in summer and 68°F in winter.
3. Computer rooms must be kept at 68°F (plus or minus 2°) and at a relative humidity of 50 percent.
4. Food and medical storage units must be kept at their required temperatures.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's operation activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being evaluated. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Cooling Systems Operation)
2. QA Checklist (Cooling Systems Operation)

The sample forms provided in this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicator 1 should be evaluated monthly by 100 percent inspection, and performance indicator 2 should be evaluated monthly by random sampling. Performance indicators 3 and 4 should be evaluated weekly using a 100 percent inspection method.

DETAILED PROCEDURES

Retrieve all of the contractor's documentation since the last evaluation. Examine the daily log every month to identify possible operational deficiencies such as extreme temperature shifts and questionable data. Note any deviations from the norm so that the COR can review them and ask the contractor for explanation or justification.

Use the record of facilities having air conditioning to schedule those areas for random sampling. Using the procedures outlined in Chapter 2 (normal surveillance, 4 percent AQL), select the facilities to be inspected. Check the temperature on the room thermometer; if a thermometer is not available, use a hand-held quick detection device. Document the results on the Cooling Systems Operation Checklist and note discrepancies.

Using the 100 percent inspection method, inspect all computer rooms to check temperature and humidity, using the room's thermometer and humidistat. If the space cannot be entered because of security restrictions, check the temperature and humidity by obtaining the information from the person responsible for each facility. If the facility does not have a thermometer or humidistat, use a hand-held temperature-checking device or psychrometer. Document the results on the Cooling Systems Operation Checklist, note discrepancies.

Check food and medical storage facilities by 100 percent inspection. Using the procedures outlined in Chapter 2, select the facilities to be inspected. Read the temperature from the thermometer, and document the results on the Cooling Systems Operation Checklist; note any discrepancies. If a unit does not contain a thermometer, note this on the checklist and direct the contractor to supply one.

EXAMPLE QA WORKSHEET

COOLING SYSTEM

QUALITY ASSURANCE WORKSHEET (COOLING SYSTEMS OPERATION)

CONTRACT REQUIREMENT: Operate the cooling systems, including air-conditioning and refrigeration systems.

PERFORMANCE INDICATORS: Use QA Checklist (Cooling Systems Operation) to record performance.

1. All required documentation is complete and has been submitted on time.
2. General-purpose rooms are kept at ambient temperatures of about 78°F in summer and 68°F in winter.
3. Computer rooms are kept at 68°F (plus or minus 2°) and at a relative humidity of 50 percent.
4. Food and medical storage units are kept at the required temperatures for each specific unit.

QUALITY ASSURANCE EVALUATION METHODS:

Performance Indicator 1 should be evaluated monthly by 100 percent inspection by checking all of the contractor's documentation. Performance Indicator 2 should be evaluated by a random monthly sample of temperatures. Performance Indicators 3 and 4 should be evaluated weekly by 100 percent inspection.

Date

B. MAINTENANCE

The contractor's activities for the maintenance of cooling systems should include a preventive maintenance inspection, preventive maintenance, and repairs.

PERFORMANCE INDICATORS

1. The contractor's PMI reports for air conditioners, refrigeration systems, and ventilation systems must be submitted on time and in an acceptable manner; QAE inspection of documentation must not show any deficiencies or discrepancies.

2. The contractor's PM has been performed for air conditioners, refrigeration systems, and ventilation systems, and QAE inspection shows no deficiencies or discrepancies in comparison to the Detailed Procedures.

3. The contracted SO and IJO work must be done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, must be comparable to the facility's original construction quality and appearance. The QAE inspection results of the facilities sampled must not show any deficiencies in comparison to the contractor's report of work completed.

Evaluation of the contractor's performance in providing these services should be scheduled by determining when the contractor intends to complete documentation of the previous month's maintenance activities and then performing the QA evaluation within 3 days. Evaluation of activities other than documentation can be scheduled according to the activity being inspected. Proper coordination of the evaluation will allow the QAE to inspect several activities at one time. The recommended methods and detailed procedures for the evaluations are described separately in the following sections.

INSPECTION FORMS

1. QA Worksheet (Cooling Systems Maintenance)

2. QA Checklist (Cooling Systems Maintenance)

The sample forms included within this section show how to use the blank forms in Appendix B.

QUALITY ASSURANCE EVALUATION METHODS

1. Performance Indicator 1. A 100 percent inspection method should be used to check the completeness of the contractor's PMI report. Unscheduled field inspection should be used for areas of poor past performance and for areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PMI report.)

2. Performance Indicator 2. Initially, a 100 percent inspection method should be used to check the completeness of the contractor's PM report and QC Checklist. Also, a random field inspection should be used for areas of poor past performance and areas specified by the KO or his/her representative. Such action should be coordinated with the KO or his/her representative. (Note: If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the contractor's PM report and QC Checklist.)

3. Performance Indicator 3. SOs should be inspected by systematic random sampling. IJOs should be checked using a 100 percent inspection method.

GENERAL PROCEDURES

1. Performance Indicator 1. Using the contractor's PMI report and the 100 percent inspection procedures, check to see that all facilities scheduled for a PMI have been recorded as such on the contractor's PMI report. Document the results on the Cooling Systems Maintenance Checklist, and compare them to the contractor's PMI report to detect discrepancies.

Use the contractor's PMI records to perform the unscheduled inspection. Determine the facilities to be sampled, including areas of poor past performance and areas specified by the KO or his/her representative. Schedule the inspection so that the QAE can accompany the contractor during his/her inspection of the scheduled facilities. Use the Detailed Procedures to measure contractor performance, and document the inspection results on the Cooling Systems Maintenance Checklist. Compare the results of the inspection to the contractor's PMI report to detect discrepancies. If discrepancies are found, the contractor should include those repair items on his/her PMI report.

2. Performance Indicator 2. Using the contractor's PM report and the 100 percent inspection method, check to see that all facilities scheduled for PM have been recorded as such on the contractor's PM report. Document the results on the Cooling Systems Maintenance Checklist, and compare them to the contractor's PM report to detect discrepancies.

Using the record of problem facilities and the systematic random sampling procedures (normal surveillance, 10 percent AQL), select the units to be inspected. Use the Detailed Procedures to measure contractor performance. Document the results on the Cooling Systems Maintenance Checklist, and compare them to the contractor's PM report to detect discrepancies.

3. Performance Indicator 3. To inspect SOs, use the contractor's report of work completed, and schedule those repairs for random sampling. Using the random sampling procedures outlined in Chapter 2 (normal surveillance, 4 percent AQL), select the repairs to be inspected. Document the results on the Cooling Systems Maintenance Checklist, and compare them to the work request to detect discrepancies.

To inspect IJOs, use the 100 percent inspection method and the contractor's report of work completed to schedule all repairs to be inspected. Document the results on the Cooling Systems Maintenance Checklist, and compare them to the work request report to detect discrepancies.

DETAILED PROCEDURES

Check to see that:

1. Belt tension and alignment are adjusted such that when moderate pressure is exerted on the belt, it does not deflect more than 1/4 in. Multiple belts have equal tension and run true in pulley sheaves. Belts show no excessive wear.
2. Oil in compressor crankcase is at normal operating level indicator.
3. There are no oil leaks.
4. The compressor runs smoothly and quietly without unusual grinding, scraping, or squealing noises.
5. Condensor coils, fan blowers, and screens are free of dirt, dust, and lint.
6. Bearings, fans, blower motors, and pumps indicate recent lubrication.
7. Motor and pump bearings operate freely.
8. Evaporator coils are free of lint, dust, and frost build-up.
9. Inlet air openings, louvers, and screens are free of lint, dirt, leaves, and similar debris.
10. Replacement duct insulation is 1 in. thick and forms a continuous vapor barrier.
11. Duct louvers, screens, and grills are free of dirt and debris.
12. Filters are not dirty or clogged.
13. There are no refrigerant leaks (use the standard halide refrigerant gas leak detector).
14. Bulbs filled with Thermostatic gas are tight against the pipe.
15. Control and monitoring lights, gauges, and meters are operative.

EXAMPLE QA WORKSHEET

COOLING SYSTEMS

QUALITY ASSURANCE WORKSHEET (COOLING SYSTEM MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all cooling-system components.

PERFORMANCE INDICATORS:

1. The contractor's PMI reports for air conditioners, refrigeration systems, and ventilation systems have been submitted on time and in an acceptable manner. QAE inspection of documentation shows no deficiencies or discrepancies.
2. The contractor's PM has been performed for air conditioners, refrigeration systems, and ventilation systems. QAE inspection shows no deficiencies or discrepancies in comparison to the Detailed Procedures.
3. The contracted SO and IJO work has been done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. Inspection results of the facilities sampled show no deficiencies in comparison to the contractor's report of work completed.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should check the contractor's PMI report by a 100 percent inspection method. Areas of poor past performance and areas specified by the KO or his/her representative should be checked by an unscheduled inspection method.
2. The QAE should use a 100 percent inspection method to check the contractor's PM work schedule. Systematic random inspection should be used to determine the facilities to be inspected. Using the population size 320, and referring to Table A1 of Appendix A gives 20 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 16.
3. The QAE should use systematic random sampling to determine the number of repairs to be inspected for SOs. Using the population size 163, and referring to Table A1 of Appendix A gives 19 number of samples and 3 number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval 9. The QAE should use a 100 percent inspection method to check all IJO repairs.

COOLING SYSTEMS

QUALITY ASSURANCE CHECKLIST (COOLING SYSTEM MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION
Bldg 413 (CIRCLE ONE) S U N
" 429 (CIRCLE ONE) S U N
" 445 (CIRCLE ONE) S U N
" 471 (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N

QAE REMARKS:

A/C compressor grown-up with weeds and squealing sound when running

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION
Bldg 930 - not cooling (CIRCLE ONE) S U N
" B17 - repair chiller (CIRCLE ONE) S U N
" 1231 - repair chiller (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N
" (CIRCLE ONE) S U N

QAE REMARKS:

unit recharged but still leaking freon.

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Leonard Hughes
Quality Assurance Evaluator

7/15/85
Date

WORKSHEETS AND CHECKLISTS:
SUPPLEMENT 1

EXAMPLE QA WORKSHEET

GAS DISTRIBUTION

QUALITY ASSURANCE WORKSHEET (GAS DISTRIBUTION OPERATIONS)

CONTRACT REQUIREMENT: Operate the gas distribution system.

PERFORMANCE INDICATORS: Use QA Checklist (Gas Distribution) to record performance.

1. The required reports have been submitted to the appropriate regulatory agencies.

2. The contractor's approved documentation for O&M of the gas distribution system show when the listed tasks were performed and are initialed by the operator.

3. The QAE has observed measurement of the odorization content of the gas.

4. If required by the contract, the contractor has collected, recorded, and submitted monthly readings for all gas customers. The QAE random inspection verifies the meter readings submitted by the contractor.

QUALITY ASSURANCE EVALUATION METHODS:

Performance indicators 1 and 2 for this task unit should be evaluated monthly, using 100 percent inspection of the contractor's documentation of performance.

Performance indicator 3 should be evaluated by a planned sampling of the contractor's measurement of the odorization content of the gas. The QAE should obtain the schedule for these tests and randomly select several opportunities to observe throughout the contract period.

Initially, performance indicator 4 should be evaluated using systematic random sampling. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____.

If the contractor's performance record has been excellent for the previous 3 months, the QAE may coordinate with the COR to substitute unscheduled verification of the meter readings, supplemented by validated customer complaints.

GAS DISTRIBUTION

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION OPERATIONS)

REQUIREMENT: The required reports have been submitted and accepted.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: Documentation of operation activities is complete.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: Gas odorization content has been measured.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: Meter readings agree with those sampled.

(CIRCLE ONE) S U N (See attached checklist.)
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION OPERATION)

Verification of Gas Meter Readings

Location/Building	Reported		Verified	
	Date	Reading	Date	Reading

Quality Assurance Evaluator

Date _____

EXAMPLE QA WORKSHEET

GAS DISTRIBUTION

Page 1 of 2

QUALITY ASSURANCE WORKSHEET (GAS DISTRIBUTION MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all gas distribution system components.

PERFORMANCE INDICATORS:

1. The contractor's documentation for maintenance of the gas distribution system has been submitted on time and is complete.

2. The contractor's PMI reports for all gas distribution systems have been submitted on time and in an acceptable manner. QAE inspection of documentation shows no deficiencies or discrepancies.

3. Random leakage checks made by the QAE verify the contractor's reports.

4. The QAE has observed the annual inspection and maintenance of key valves, relief devices, and regulator stations.

5. The contractor's PM has been performed for all gas distribution systems, and QAE inspection shows no deficiencies or discrepancies.

6. The contracted SO and IJO work was accomplished in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. The QAE inspection results of the facilities sampled for the contractor's report of work completed show no deficiencies in accordance with Army TM 5-654.

QUALITY ASSURANCE EVALUATION METHODS:

1. A 100 percent inspection method should be used to inspect the completeness of the contractor's reports.

2. The QAE should inspect the contractor's PMI report by a 100 percent inspection method. The QAE should make an unscheduled inspection of areas of poor past performance and those areas specified by the KO or his/her representative.

3. The QAE should use a systematic random sampling method to determine the number of places to be inspected for leaks. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable

rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval _____.

4. The QAE should use a systematic random sampling method to determine the number of valves to be inspected to see that they have been exercised. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval _____.

5. The QAE should use a 100 percent inspection method to inspect the contractor's PM report. He/she should make an unscheduled inspection to areas of poor past performance and those areas specified by the KO or his/her representative.

6. The QAE should use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval _____. The QAE should use a 100 percent inspection method to inspect all IJO repairs.

GAS DISTRIBUTION

Page 1 of 3

QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's documentation shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: Random leakage checks made by the QAE verify the contractor's reports.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION MAINTENANCE)

REQUIREMENT: The QAE has observed the annual inspection and maintenance of key valves, relief devices, and regulator stations.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's PM report shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Page 3 of 3

QUALITY ASSURANCE CHECKLIST (GAS DISTRIBUTION MAINTENANCE)

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Quality Assurance Evaluator

Date

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. SUPPLY STATION OPER.)

CONTRACT REQUIREMENT: Operate the electric supply station to provide uninterrupted electrical service.

PERFORMANCE INDICATORS: Use QA Checklist (Electric Supply Station Operation) to record performance.

1. The contractor's logs and checklists for electric supply station operation are complete with dates and include the initials of the person doing the work.

2. The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

QUALITY ASSURANCE EVALUTION METHODS:

Performance indicators 1 and 2 should be evaluated monthly by 100 percent inspection.

QUALITY ASSURANCE CHECKLIST (ELECT. SUPPLY STATION OPER.)

REQUIREMENT: All required documentation is complete and has been submitted on time.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

(CIRCLE ONE) S U N
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Quality Assurance Evaluator

Date

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. SUPPLY STATION MAINT.)

CONTRACT REQUIREMENT: Perform maintenance activities for all electrical supply station components.

PERFORMANCE INDICATORS:

1. The contractor's inspection and maintenance records are complete and all sections of the system are inspected regularly. Necessary work is identified, and preventive maintenance activity reports have been submitted on time. QAE inspection shows no deficiencies or discrepancies.

2. An on-site inspection of the electric supply station shows that the site's operation and conditions comply with indicators described in the detailed procedures.

3. The contractor's PM has been performed for all electrical supply station components, and QAE inspection shows no deficiencies or discrepancies according to the detailed procedures.

4. The contracted SO and IJO work has been done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. Comparison of the QAE inspection results with the contractor's report of work completed shows no deficiencies.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should inspect the contractor's PMI report by a 100 percent inspection method. Poor past performance areas and those areas specified by the Contracting Officer or his/her representative should be checked by an unscheduled inspection method.

2. The QAE should inspect the performance of the contractor's PMI by using a 100 percent sampling method.

3. The QAE should check contractor's PM report by a 100 percent inspection method. A systematic random inspection method should be used to determine the facilities to be inspected. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval _____.

4. The QAE should use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the

population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first samples to be inspected. The population size should be divided by the sample size to determine the interval _____. A 100 percent inspection method should be used to inspect all IJO repairs.

ELECTRIC SUPPLY STATIONS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. SUPPLY STATION MAINT.)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's on-site inspection of the electric supply station shows no deficiencies.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. SUPPLY STATION MAINT.)

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Quality Assurance Evaluator

Date

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. DIST. OPERATION)

CONTRACT REQUIREMENT: Operate the electrical distribution systems to provide uninterrupted electrical service.

PERFORMANCE INDICATORS: Use QA Checklist (Electrical Distribution Operation) to record performance.

1. All required documentation is complete and has been submitted on time.

2. The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

3. The contractor has exercised the auxiliary generators and auxiliary power operations.

4. The contractor has exercised the automatic start and load assumption cycles.

QUALITY ASSURANCE EVALUATION METHOD:

Performance indicators 1 and 2 should be evaluated monthly by 100 percent inspection. Performance indicator 3 should be evaluated by unscheduled inspection, and performance indicator 4 should be evaluated quarterly on a 100 percent basis.

ELECTRIC SUPPLY STATIONS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. OPERATION)

REQUIREMENT: All required documentation is complete and has been submitted on time.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The contractor's outage records are complete with dates, length of outage, cause of outage, and corrective action taken.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The contractor has exercised the auxiliary generators and auxiliary power operations.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. OPERATION)

REQUIREMENT: The contractor has conducted exercises of the automatic start and load assumption cycles.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Quality Assurance Evaluator

Date

EXAMPLE QA WORKSHEET

ELECTRIC SUPPLY STATIONS

QUALITY ASSURANCE WORKSHEET (ELECT. DIST. MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all electrical distribution system components.

PERFORMANCE INDICATORS:

1. The contractor's inspection and maintenance records are complete, and all sections of the system are inspected regularly. Necessary work is identified and preventive maintenance activity reports have been submitted on time. QAE inspection shows no deficiencies or discrepancies.

2. On-site inspection of the electric distribution plant shows that the site's operation and conditions comply with indicators described in the Detailed Procedures.

3. The contractor's PM has been performed for all electrical distribution system components, and QAE inspection shows no deficiencies or discrepancies in accordance with the Detailed Procedures.

4. The contracted SO and IJO work is done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. When compared to the contractor's report of work completed, the QAE inspection results of the facilities show no deficiencies.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should check the contractor's PMI report by a 100 percent inspection method. The QAE should inspect areas of poor past performance and those areas specified by the KO or his/her representative using an unscheduled inspection method.

2. The contractor's PMI should be inspected by a systematic random sampling method. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____.

3. A 100 percent inspection method should be used to inspect the contractor's PM report. The QAE should use a systematic random inspection method to determine the facilities to be inspected. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of

samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____.

4. The QAE shall use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____. The QAE should use a 100 percent inspection method to check all IJO repairs.

ELECTRIC SUPPLY STATIONS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's on-site inspection of the electrical distribution plant shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

QUALITY ASSURANCE CHECKLIST (ELECT. DIST. MAINTENANCE)

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Quality Assurance Evaluator

Date

HEATING SYSTEMS AND RELATED FACILITIES

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (HEATING SYSTEMS OPERATION)

REQUIREMENT: All required documentation has been submitted on time and in an acceptable manner.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The output pressure of the steam from the boiler conforms to the Standard Operating Procedures.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The contractor has reported all operational emergencies within 30 minutes.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The contractor has alleviated all emergency situations within 2 hours.

(CIRCLE ONE) S U N
QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Page 2 of 2

QUALITY ASSURANCE CHECKLIST (HEATING SYSTEMS OPERATION)

REQUIREMENT: As necessary or at the request of the COR, a deactivated boiler has been brought on-line within 8 hours.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The contractor has operated the incinerator during the period identified in the contract.

(CIRCLE ONE) S U N
QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Quality Assurance Evaluator

Date _____

EXAMPLE QA WORKSHEET

HEATING SYSTEMS AND RELATED FACILITIES

QUALITY ASSURANCE WORKSHEET (HEATING SYSTEMS OPERATION)

CONTRACT REQUIREMENT: Operate the heating systems.

PERFORMANCE INDICATORS. (Use the QA Checklist [Heating Systems Operation] to record performance.)

1. All required documentation has been submitted on time and in an acceptable manner.
2. The output pressure of the steam from the boiler conforms to the installation's standard operating procedures.
3. The contractor has reported all operational emergencies within 30 minutes.
4. The contractor has alleviated all emergency situations within 2 hours.
5. As necessary, or at the request of the COR, a deactivated boiler has been brought on-line within 8 hours.
6. The contractor has operated the incinerator during the period identified in the contract.

QUALITY ASSURANCE EVALUATION METHODS

Performance indicator 1 should be evaluated monthly by 100 percent inspection. Performance indicators 2, 3, and 4 should be evaluated weekly by 100 percent inspection of the strip record of measured pressures. Performance indicator 5 should be evaluated by a planned sampling of the work as it is completed. Performance indicator 6 should be evaluated by an unscheduled inspection during incinerator operating hours and supplemented by validated complaints.

EXAMPLE QA WORKSHEET

HEATING SYSTEMS AND RELATED FACILITIES

QUALITY ASSURANCE WORKSHEET (HEATING SYSTEM MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all heating system components.

PERFORMANCE INDICATORS:

1. The contractor's PMI reports for boilers, distribution systems, incinerators, mechanical rooms, and laundry support equipment have been submitted on time and in an acceptable manner. QAE inspection of documentation shows no deficiencies or discrepancies.

2. The contractor's PM has been performed for boilers, distribution systems, incinerators, mechanical rooms, and laundry support equipment. QAE inspection shows no deficiencies or discrepancies in comparison to the Detailed Procedures.

3. The contracted SO and IJO work has been done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the original facility's construction quality and appearance. In comparison to the contractor's report of work completed, the QAE inspection results of the facilities sampled show no deficiencies.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should inspect the contractor's PMI report by a 100 percent inspection method. Areas of poor past performance and areas specified by the KO or his/her representative should be checked by unscheduled inspection.

2. The QAE should use a 100 percent inspection method to check the contractor's PM work and should use a systematic random inspection method to determine the facilities to be inspected. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____.

3. The QAE should use a systematic random sampling method to determine the number of repairs to be inspected for SOs. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____, number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____. The QAE should use a 100 percent inspection method to inspect all IJO repairs.

HEATING SYSTEMS AND RELATED FACILITIES

QUALITY ASSURANCE CHECKLIST (HEATING SYSTEM MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

Quality Assurance Evaluator

Date

EXAMPLE QA WORKSHEET

COOLING SYSTEM

QUALITY ASSURANCE WORKSHEET (COOLING SYSTEMS OPERATION)

CONTRACT REQUIREMENT: Operate the cooling systems, including air-conditioning and refrigeration systems.

PERFORMANCE INDICATORS: Use QA Checklist (Cooling Systems Operation) to record performance.

1. All required documentation is complete and has been submitted on time.

2. General-purpose rooms are kept at ambient temperatures of about 78°F in summer and 68°F in winter.

3. Computer rooms are kept at 68°F (plus or minus 2°) and at a relative humidity of 50 percent.

4. Food and medical storage units are kept at the required temperatures for each specific unit.

QUALITY ASSURANCE EVALUATION METHODS:

Performance indicator 1 should be evaluated monthly by 100 percent inspection by checking all of the contractor's documentation. Performance indicator 2 should be evaluated by a random monthly sample of temperatures. Performance indicators 3 and 4 should be evaluated weekly by 100 percent inspection.

COOLING SYSTEMS

Page 1 of 2

QUALITY ASSURANCE CHECKLIST (COOLING SYSTEMS OPERATION)

REQUIREMENT: All required documentation is complete and has been submitted on time.

(CIRCLE ONE) S U N

QAE REMARKS:

REQUIREMENT: The ambient temperature of general-purpose rooms has been maintained at 78°F in summer and 68°F in winter.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

REQUIREMENT: Computer rooms have a temperature of 68° (plus or minus 2°) and have a relative humidity of 50 percent.

LOCATION

_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
"U" = Unsatisfactory
"N" = Not applicable

QUALITY ASSURANCE CHECKLIST (COOLING SYSTEM OPERATION)

REQUIREMENT: Food and medical storage units have been kept at the required temperatures for each specific unit.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Quality Assurance Evaluator

Date

EXAMPLE QA WORKSHEET

COOLING SYSTEMS

QUALITY ASSURANCE WORKSHEET (COOLING SYSTEM MAINTENANCE)

CONTRACT REQUIREMENT: Perform maintenance activities for all cooling-system components.

PERFORMANCE INDICATORS:

1. The contractor's PMI reports for air conditioners, refrigeration systems, and ventilation systems have been submitted on time and in an acceptable manner. QAE inspection of documentation shows no deficiencies or discrepancies.

2. The contractor's PM has been performed for air conditioners, refrigeration systems, and ventilation systems. QAE inspection shows no deficiencies or discrepancies in comparison to the Detailed Procedures.

3. The contracted SO and IJO work has been done in a timely, effective, and workmanlike manner. The overall quality and appearance of the repair, including materials, are comparable to the facility's original construction quality and appearance. Inspection results of the facilities sampled show no deficiencies in comparison to the contractor's report of work completed.

QUALITY ASSURANCE EVALUATION METHODS:

1. The QAE should check the contractor's PMI report by a 100 percent inspection method. Areas of poor past performance and areas specified by the KO or his/her representative should be checked by an unscheduled inspection method.

2. The QAE should use a 100 percent inspection method to check the contractor's PM work schedule. Systematic random inspection should be used to determine the facilities to be inspected. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____.

3. The QAE should use systematic random sampling to determine the number of repairs to be inspected for SOs. Using the population size _____, and referring to Table A1 of Appendix A gives _____ number of samples and _____ number of allowable rejects. Any collection of randomized numbers can be used to determine the first sample to be inspected. The population size should be divided by the sample size to determine the interval _____. The QAE should use a 100 percent inspection method to check all IJO repairs.

COOLING SYSTEMS

QUALITY ASSURANCE CHECKLIST (COOLING SYSTEM MAINTENANCE)

REQUIREMENT: QAE inspection of the contractor's PMI report shows no deficiencies.

(CIRCLE ONE) S U N
QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's preventive maintenance shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

REQUIREMENT: The QAE's inspection of the contractor's repairs shows no deficiencies.

LOCATION	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N
_____	(CIRCLE ONE)	S	U	N

QAE REMARKS:

NOTE: "S" = Satisfactory
 "U" = Unsatisfactory
 "N" = Not applicable

Quality Assurance Evaluator

Date

END

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